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Trends in Non-Communicable Disease Mortality at the Bono Regional Hospital, Sunyani-Ghana

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Abstract: Cardiovascular disorders (such as heart attacks and strokes), cancer, chronic respiratory diseases (such as chronic obstructive pulmonary disease and asthma), and diabetes are the most common non-communicable diseases in the world. Projecting mortality patterns can offer policymakers and planners with useful information. This study employed a retrospective approach which involved taking secondary data from events that have already occurred and making inferences and projections about the future. A trend line was used to forecast the death rate. The cause specific mortality rates of the four main NCDs (cancer, cardiovascular diseases, chronic respiratory diseases and diabetes) were extracted from DHIMS (District Health Information Management System). The information gathered was entered into Microsoft Excel 2016. The mortality rates were then categorized into their respective groups and a time-series graph was used to graphically present the trend of NCD mortality from 2013 to 2021. The projection for the upcoming years was done by fitting a 'trend line' into the time series graph that was already generated. The findings showed that cancer had a mortality rate of 0 for the seven-year period, CVDs had a mortality rate of 3.4% for the same period, CRDs had a mortality rate of 1.4% and diabetes had a mortality rate of 0.8% for the same period. The findings further showed that males had higher mortality rates than females for most years during the seven-year period. The mortality rates for three categories of non-communicable diseases will continue to increase (CVDs: 3.4% to 3.7%, CRDs: 1.4% in 2013 to 1.9% in 2020, diabetes 0.8% in 2013 to 1.2% in 2025). At Bono regional Hospital, by 2025, mortality rates from non-communicable diseases are expected to rise. This could be due to the fact that the country is still developing, and as a result, people are picking up unhealthy habits from the developed countries.

Keywords: Non-communicable disease, mortality, trends, projections

1.0 INTRODUCTION

Following an epidemiologic and demographic shift, noncommunicable diseases are becoming the leading cause of death in developing countries (Sanuade, 2012). A non-communicable

disease is one that is not infectious or spreadable from person to person. The most common non-communicable diseases are cardiovascular disorders (such as heart attacks and strokes), cancers, chronic respiratory diseases (such as chronic obstructive pulmonary disease and asthma), and diabetes. The four primary categories of non-communicable diseases have increased in recent years as a result of population aging, globalization, urbanization and lifestyle changes. It affects people of all ages, from all walks of life and from all countries. Noncommunicable diseases kill over 41 million people each year, accounting for more than 71% of all deaths worldwide (WHO, 2016).

It is important to note that the death and burden due to noncommunicable diseases are unevenly distributed around the world. Poor and middle-income countries, including Ghana, account for 77% of all noncommunicable diseases, according to reports. Cardiovascular disease is the most common NCD, killing 17.9 million people each year, followed by cancer (9.3 million), respiratory disorders (4.1 million), and diabetes (4.1 million) (WHO, 2021). Chronic NCDs account for 60% of the estimated 58 million deaths worldwide each year, as well as 44% of premature deaths. Age-standardized disability-adjusted life year (DALY) rates for NCDs are higher in low and middle-income countries (LMICs) than in high-income countries. (WHO, 2022). The LMICs, which make up the majority of the world's population, account for 80% of chronic illness mortality. People in these countries are more likely than people in high-income countries to develop disease at a younger age, suffer for longer periods of time, and die at a younger age (Ministry of Health, 2012). Despite the fact that these diseases are commonly associated with people in their later years, research shows that more than 15 million people die from NCDs between the ages of 30 and 69 (Sanuade, 2012).

The NCDs also have large indirect costs to society in terms of reduced productivity, lost working days, and production losses, in addition to negative effects on people's quality of life, making it critical to engage in combating NCDs in order to meet the Sustainable Development Goals (UN, 2014). Individuals with lower income and education are more exposed to risk factors and have less access to information and health services, which contributes to even greater social inequality (Aikins et al., 2014). Premature deaths (30 to 69 years) from NCDs typically affect people with lower incomes and education levels, who are more vulnerable to risk factors and have less access to information and health services, contributing to even greater social inequality (Carvalho Malta et al., 2020). A poor diet and lack of physical activity are all symptoms of high blood pressure (BP), high blood glucose, high blood lipids, and obesity. These are referred to as metabolic risk factors, and they can contribute to cardiovascular disease, which is the leading cause of premature death among NCDs. High blood pressure is the most common cause of death due to metabolic risk factors (it accounts for 19% of all deaths worldwide), followed by overweight, obesity, and high blood glucose (Shadmani et al., 2019). The study was therefore aimed at describing the trends of non-communicable disease mortality rate and projecting the mortality rate by 2025 since it could inform policies tailored towards addressing the NCDs canker.

2.0 MATERIALS AND METHODS

2.1 Research Design and Study Population

A retrospective study was conducted within seven-year (2013-2020) period as it involved taking data from events that have already occurred to make inferences and projections about the future. This enabled the researchers to predict the mortality rates by 2025.

The target population of the study was all persons who died as a result of the four main NCDs (cancer, cardiovascular diseases, chronic respiratory diseases and diabetes) at the Bono Regional Hospital, Sunyani, Ghana.

2.2 Data Analysis

The cause specific mortality rates of the four main NCD was extracted from DHIMS 2 (District Health Information Management System) with access and help from the Health information manager in charge at the Bono Regional Hospital. The mortality rates were then categorized into their respective groups and a time- series graph was used to graphically present the trend of NCD mortality from 2013 to 2020. The projection for the upcoming years was done by fitting a “trend line” into the time series graph that was already generated. The formula generated from the trend line was used for the future mortality projections.

3.0 RESULTS

3.1 Overview

In order to analyse disease epidemiologically, person, place and time are used. Hence the researchers sought to describe the population in this format. The person was described using gender and age with the ages being categorized into 4 groups i.e. 0-14 years, 15-34 years, 35-59 years and 60 years and above. Place was the bono regional hospital and time were the years selected from 2013 to 2020.

3.2 Admissions

Table 1: Admissions based on year

Period	Females	Males	Total
2013	3729	2806	6535
2014	4373	4027	8399
2015	3957	3586	7543
2016	3176	2771	5947
2017	2716	2227	4943
2018	2930	2561	5491
2019	2395	1973	4369
2020	2700	2289	4989
Average	3247	2780	6027

Source: DHIMS2, 2022

Table 1 shows the number of inpatients admitted for each year as well as their genders. An average of 7119 total admission was calculated for the years with the averages showing that there were more (3247) females than males (2780) for the seven-year period.

Table 2: Admissions for all years by gender and age groups

Age group	Frequency	Percentage%
Females		

0-14 years	3884	15.95
15-34 years	3012	11.59
35-59 years	11823	45.51
60+ years	7258	27.94
Total	25976	100.00

Males		
0-14 years	5055	22.73
15-34 years	5894	26.50
35-59 years	6250	28.10
60+ years	5041	22.67
Total	22241	100.00

Source: DHIMS2, 2022

In order to calculate the mortality rates for each year the total number of admissions is an inevitable factor hence data was extracted and they are as follows.

During the seven-year period (2013 to 2020), the total number of people admitted for females who were within the age group of 35 to 35 had the highest number with 45% (11823) admissions followed by 60 years and above with 27.9% (7258) admissions. The group with the lowest number of admissions for the seven-year period was 15 to 34 years with 11.6% (3012) inpatients. The males also had the highest number of admissions coming from the age group 35-59 years 28.1% (6250) admissions. Next was 26.5% (5894) admissions which can be attributed to 15-34 years and the lowest was 0-14 years which had 22.73% (5055) admissions.

3.3 Mortality

Literature has demonstrated that a certain cause of death does not affect males and females equally (Pollard et al., 2013). The necessity of displaying the proportionate mortality of CVDs by sex is further emphasised by the fact that female mortality at birth and throughout life is lower than male mortality in the majority of countries.

Table 3: Number of deaths from 2013 to 2020 by gender

Period	Males	Females	Total
2013	202 (57.1%)	151 (42.9%)	352
2014	207 (58.4%)	148 (41.6%)	355
2015	211 (60.7%)	136 (39.3%)	347
2016	117 (62.3%)	72 (37.7%)	188
2017	86 (47.5%)	96 (52.5%)	182

2018	141 (57.2%)	106 (42.8%)	247
2019	142 (52.5%)	128 (47.5%)	270
2020	165 (58.2%)	118 (41.8%)	283
Total	1271(56.1)	995(43.9)	2226

Source: DHIMS2, 2022

Table 3 above shows that the mortality was higher amongst males compared to females for the seven-year period. Also, the results show in general, about 56.1% from 2013 to 2020 occurred among males.

3.4 Seven-year trends of mortality rate due to cancers, cardiovascular disease, respiratory diseases and diabetes.

3.4.1 Cancer Mortality rate Trend

Figure 1 below shows the trend in cancer mortality rates for the seven- year period from 2013 to 2020. It should be noted that cancer had no mortality rate from 2013 until 2020.

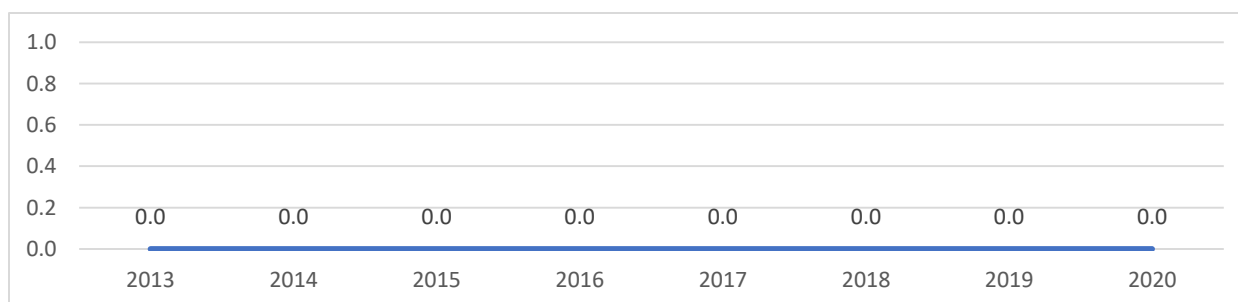


Figure 1: Mortality rate for cancer

3.4.2 Cardiovascular Disease Mortality Rate

Figure 2 below shows a presentation of the trends in cardiovascular diseases for the seven-year period from 2013 to 2020. It should be noted that the mortality rate had two peaks in 2013 and in 2019. Cardiovascular diseases had a decrease in mortality from 2013 to 2015. There was a sharp decline in mortality rate in 2016. The mortality rate went down from 2.7% in 2015 to 1.3% in 2016. It remained stable for the next year thus 2017. 2019 had the highest mortality rate with the mortality being 3.5%. It then decreased to 3.4% in 2020.

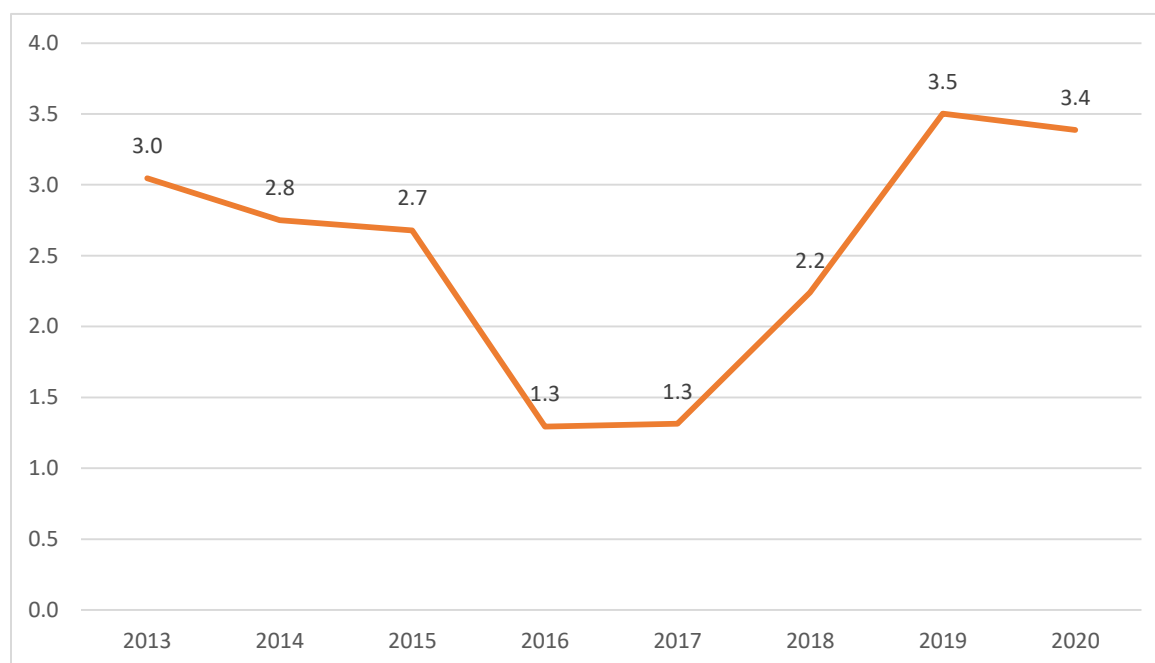


Figure 2: Cardiovascular disease mortality rate from 2013 to 2020

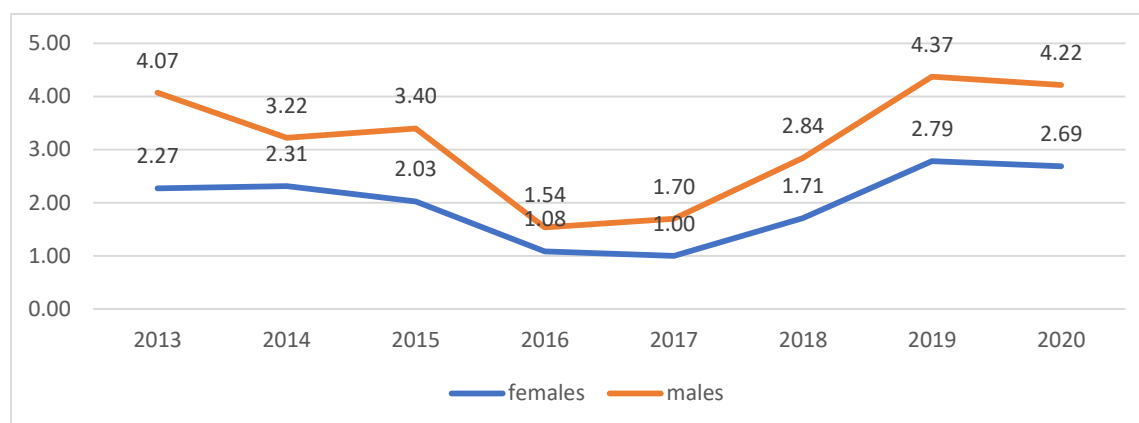


Figure 3: Cardiovascular disease mortality rate by gender

The figure above shows the mortality rate trend of males as well as females from 2013 to 2020. It is shown that throughout the seven-year period, males had the highest mortality rate compared to females. The highest mortality rate for males was 4.37% in 2019. With the lowest being 1.54 % in 2014. On the contrary females had their lowest mortality rate in 2017 with 1.00%. Their highest mortality rate was also recorded in 2019 thus 2.79%.

3.4.3 Chronic Respiratory Disease Mortality Rate

Figure 3 below shows the trend on chronic respiratory disease in Bono Regional hospital for the less than a decade from 2013 to 2020.

It should be noted that chronic respiratory disease mortality rate had three peaks. The findings also showed an increasing trend for the seven-year period from 2013 to 2020.

Chronic respiratory diseases mortality rate started with a 1.3% mortality rate in 2013, a decrease in mortality rate in 2014 saw it reach 0.8%. 1.1% was in 2015. The mortality rate further increased to 1.5% in 2016. The highest mortality rate was recorded in 2017 with 2.0%. The trend started to decline in 2018 and 2019 thus 1.3% and 1.2% respectively.

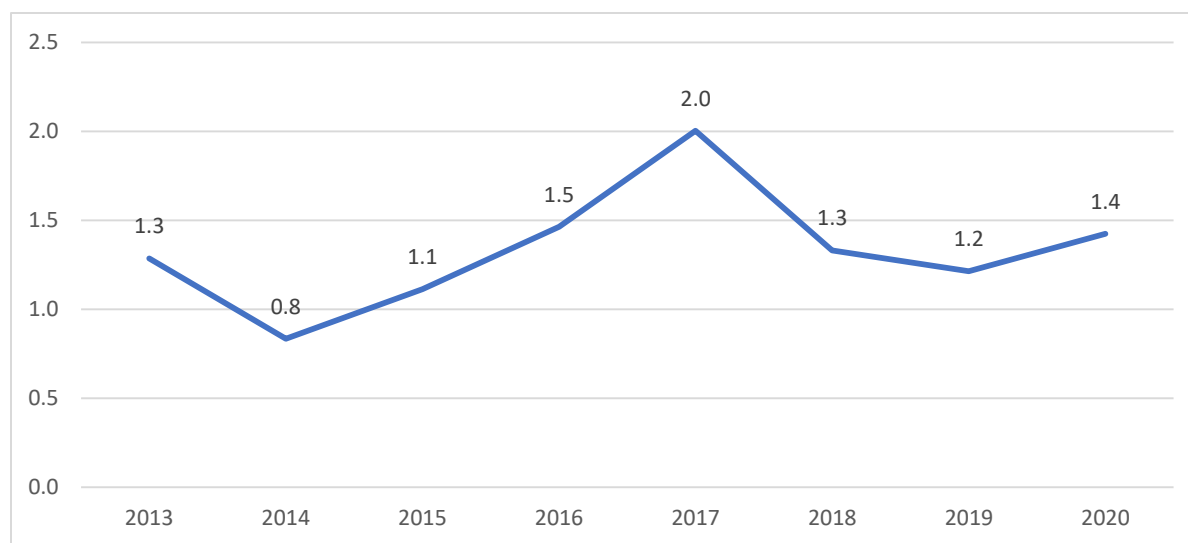


Fig4: Chronic Respiratory Disease Mortality rate from 2013 to 2020.

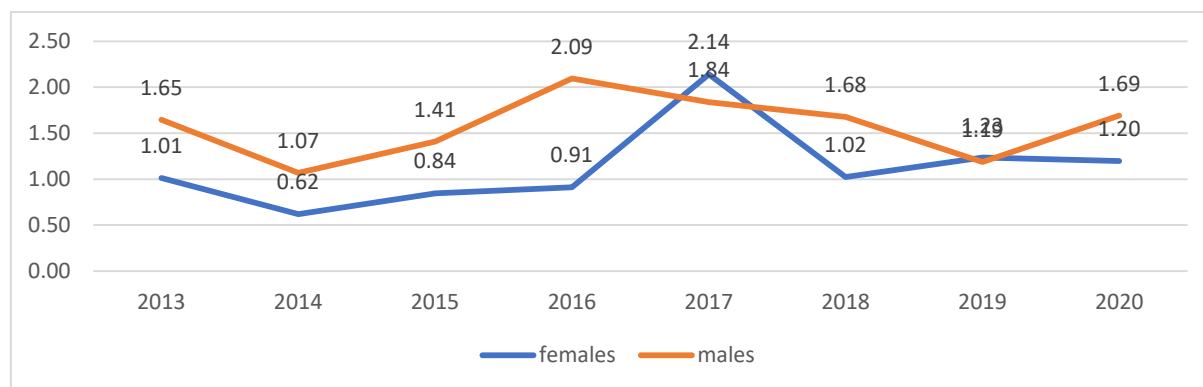


Figure 5: Chronic Respiratory disease mortality rate by gender

The figure above indicates that for chronic respiratory diseases, males for most years had the highest mortality rate. It changed in 2017 and 2019 where females had higher mortality rates than males thus 2.14% females compared to 1.84% males in 2017. Also, 1.23% compared to 1.19% males. The mortality rate for males was at its highest point in 2016 (2.09%) and 2017 was the

year with the highest for females. Both males and females had the lowest mortality in 2014 with 1.07% and 0.62% respectively.

3.4.4 Diabetes Mortality Rate Trend

The mortality trend for diabetes was 1.1% in 2013. In 2014, it decreased to 0.6% the trend then increased to 0.8% in 2015. The mortality rate decreased again to 0.4% in 2016. Morality rate was slightly stable in 2017 retaining the 0.4%. It reduced further to 3% in 2018. The Mortality rate then increased sharply to 1.5% in 2019. The mortality rate settled at 0.8% in 2020.

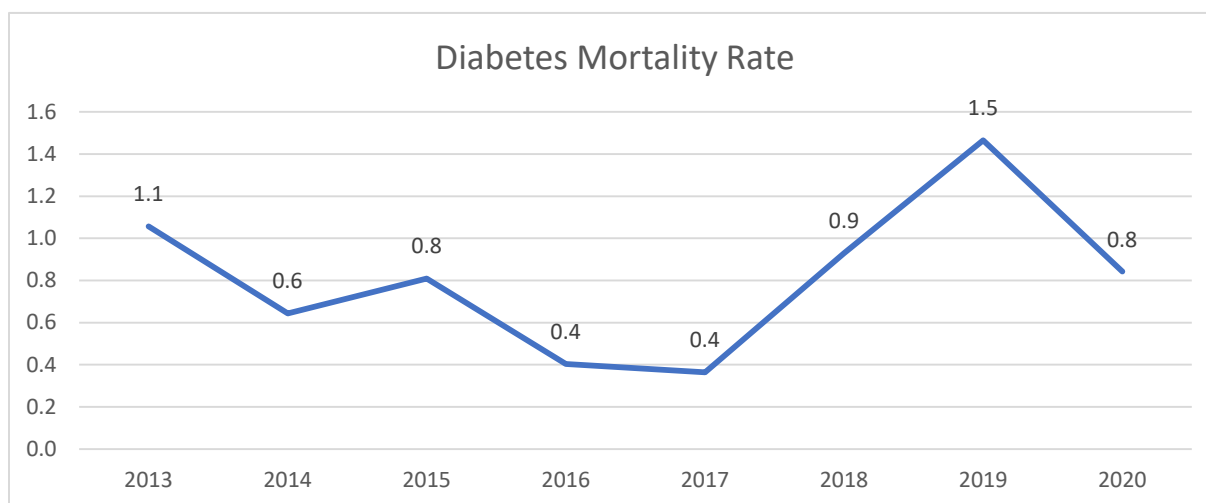


Figure 6: Trends of diabetes mortality rate from 2013 to 2020

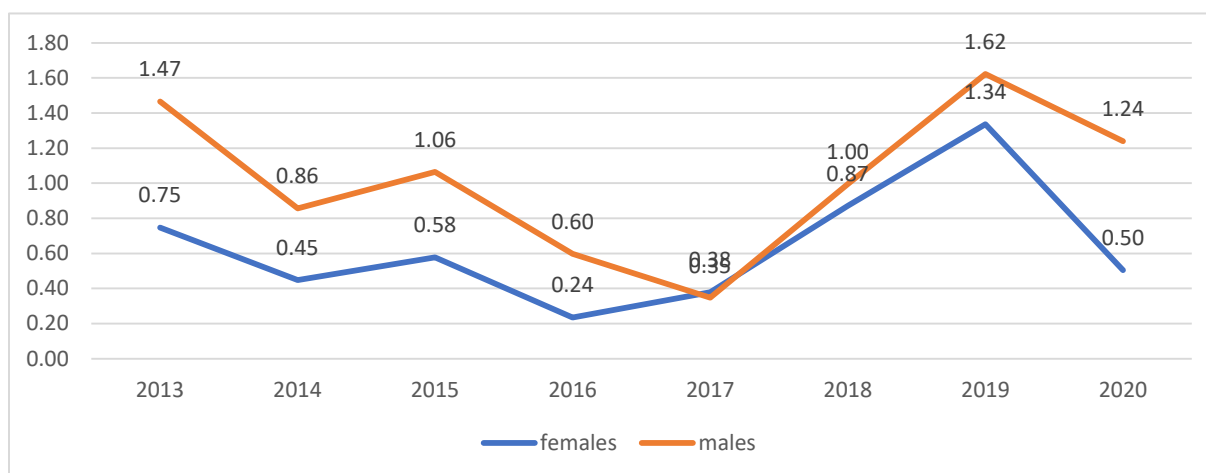


Figure 7: Diabetes mortality rate by gender

Males have a higher mortality rate compared to females as shown in the figure 6. Both mortality rates were high for females and males in 2019 thus 1.62% males and 1.34% females. Females had their lowest mortality in 2016 with 0.24% whilst the lowest for males were in 2017 with 0.38%.

3.5 Mortality rate projection for the four main communicable diseases.

Table 4: Mortality rates for the four categories of non-communicable diseases for 2013, 2020, 2025.

Variable	Timeline	Mortality Rate %
CVD	2013	3
	2020	3.4
	2025	3.7
	change %	18.92
Respiratory diseases	2013	1.3
	2020	1.4
	2025	1.9
	change %	31.58
diabetes	2013	1.1
	2020	0.2
	2025	1.2
	change %	8.33

Per the trend analysis of the mortality rates done, it is anticipated that if conditions remain the same, the mortality rate for cancers, CVD, diabetes, and respiratory diseases will continue to increase from 2013 to 2025. The mortality rate from CVDs is expected to increase from 3% in 2013 to 3.7% in 2025. The mortality rate of respiratory diseases is also expected to increase from 1.3% in 2015 to 1.9% in 2025. Furthermore, the mortality rate for Diabetes is expected to increase from 1.1% in 2013 to 1.2% in 2025.

3.6 Trend and projection of mortality rate of the Non-communicable Diseases

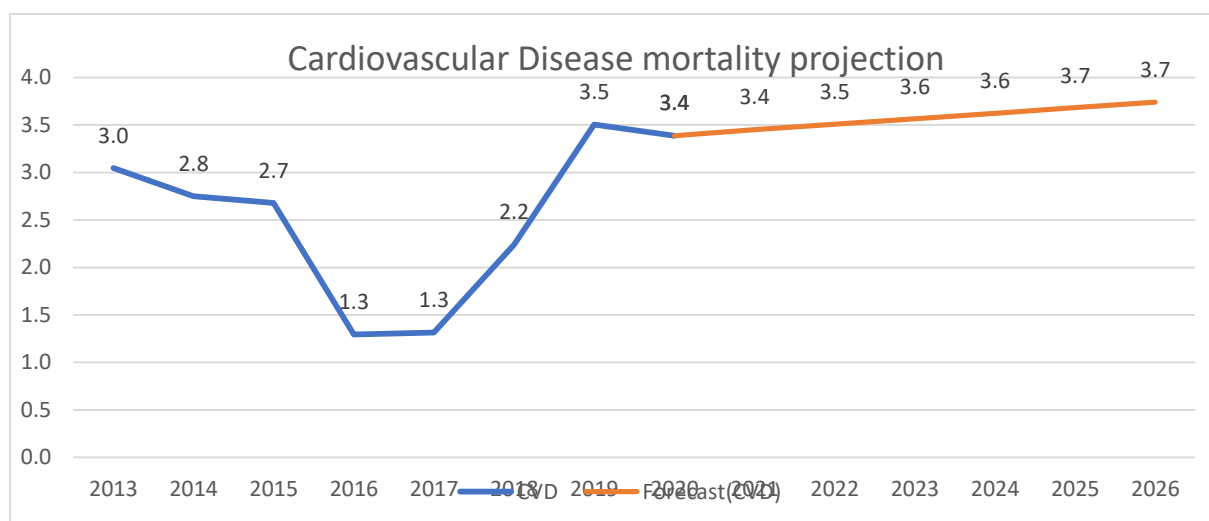


Fig 8: Cardiovascular disease mortality rate projection

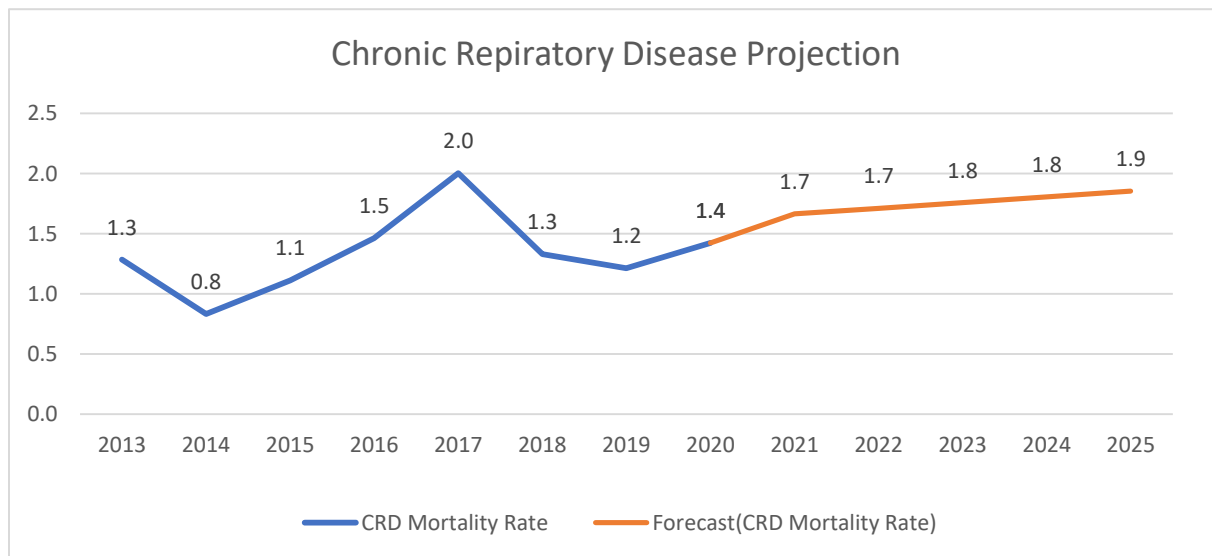


Fig 9: Chronic Respiratory Disease Mortality Rate Projection

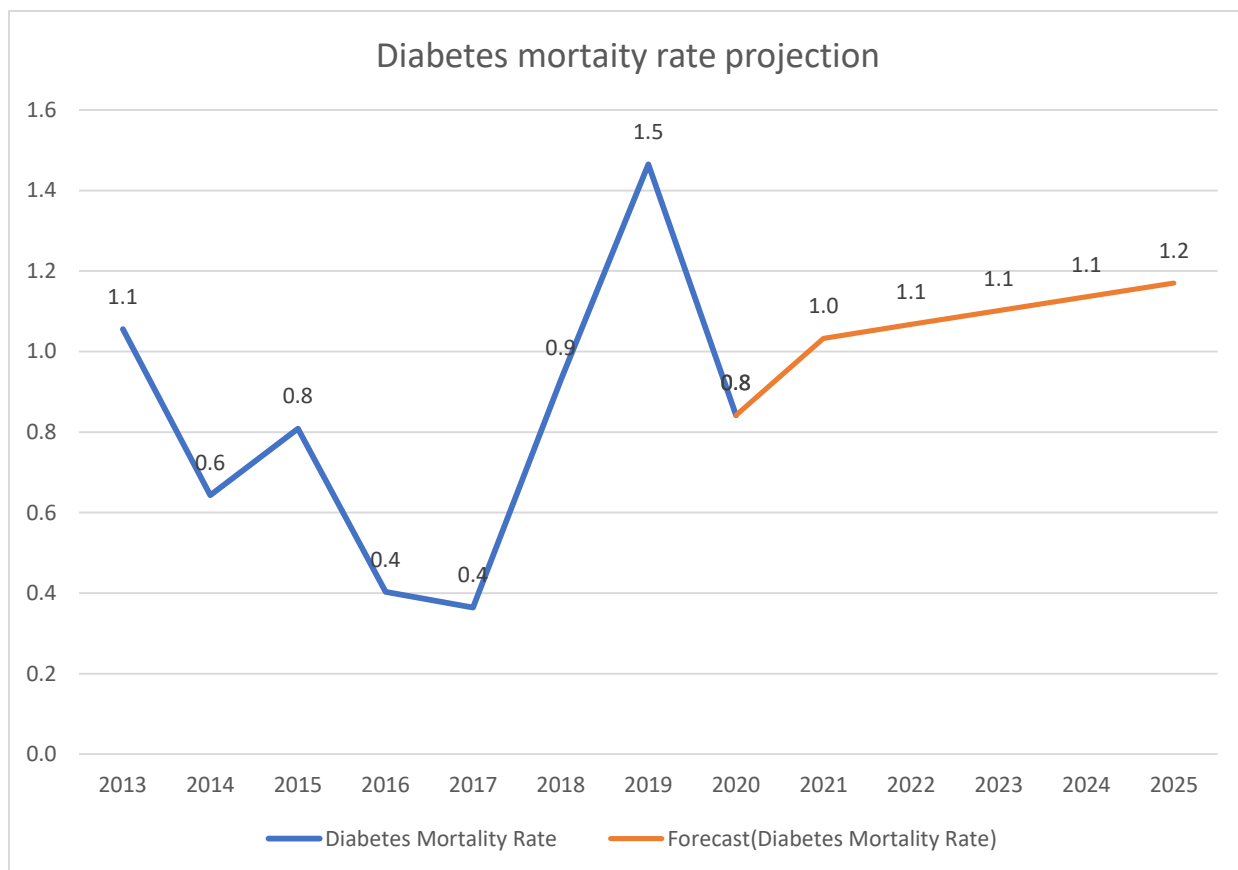


Fig 10: Diabetes Mortality rate Projection

The above figures (Fig 8, Fig 9 & Fig 10) show the trend of non-communicable disease mortality rates less than a decade from 2013 to 2020 as well as the projections for the next five years from 2020 to 2025. Overall the predicted mortality rates for all four categories of diseases had an upward trend. Another point that should be highlighted is that cancer had the lowest mortality rate trend for the seven years. (all mortality rates were 0%). Also, the mortality rate for cardiovascular diseases is expected to be the highest from 2020 to 2025 i.e increasing from 3.0% to 3.4% in 2021 to 3.7% in 2025.

The mortality rates due to chronic respiratory diseases showed an increasing trend. The mortality rate for chronic respiratory diseases is expected to increase from 1.4% in 2020 to 1.9% in 2025. In 2025 the mortality rate is expected to be 8.7%. Diabetes is also expected to increase from 0.8% in 2021 to 1.2% in 2025.

4.0 DISCUSSION

The purpose of the study was to describe the trends of the death rates as a result of four groups of non-communicable diseases (cancer, cardiovascular diseases, chronic respiratory diseases and diabetes.) from 2013 to 2020 and also predict the trend of mortality rates for the next five years (2020 to 2025).

It should be noted that, the findings refer to the mortality rates over the course of a thirteen-year period, and therefore it was important to put these numbers in context. Bearing in mind that the estimates made in this report are intended to give only a very rough sense of how the trends may look like if factors that influenced the mortality rates for the seven-year period continues for five years.

It is worth mentioning that 2019 had the greatest mortality rate for cardiovascular disease and diabetes when compared to all other years combined, confirming that Tan (2020) was correct in his assertion that ignoring and focusing on COVID-19 could result in not only a disruption in the care given to chronic non-communicable diseases like diabetes but also a reduction in education and resources used to increase non-communicable disease prevention, thereby increasing non-communicable disease mortality rates.

4.1 Trends of non-communicable disease mortality for the four categories (cancer, cardiovascular diseases, respiratory diseases and diabetes)

4.1.1 Cancer mortality rate trends

Surprisingly, the study showed that cancer has no mortality rate (0) in comparison to the other categories listed but according to (WHO, 2021) cancer is the second deadliest non-communicable disease. There are no proven reasons for the low mortality rate for cancer. But there are speculations the reason for low mortality may be because, the people living with cancer did not access the hospital, or probably cancer mortality data is underreported in Bono Regional hospital. The results were in contrast to those done in Brazil where cancer had the third highest mortality rate compared to the three non-communicable diseases analyzed in this study. (Carvalho Malta et al., 2020)

A previous study has been done globally by ReFaey et al. (2021) on cancer and cardiovascular disease mortality rates where the cancer mortality rate was increasing every year is in contrast with the findings in this study. According to Yang et al (2020) on the mortality rate in the United

States, the mortality rate for cancer keeps on reducing. WHO (2021) also estimates that the mortality rate will increase from 7.4 million to 11.8 million from 2004 to 2030 respectively.

4.1.2 Cardiovascular diseases mortality rate trend

The findings of this study showed that cardiovascular diseases had the most mortality for the seven-year period. This was evident in the fact that the mean mortality rate for cardiovascular diseases was 2.5% from 2013 to 2020. Proving the fact that cardiovascular disease is responsible for most non-communicable disease deaths according to the World Health Organization. (WHO, 2021). In the study conducted by ReFaey et al. (2021), the mortality rate for cardiovascular diseases also had an increasing trend from the beginning of the 21st century to 2015. This agreed with the findings of this study because generally, the findings revealed that there was an overall upward trend in CVD increasing mortality rates. The findings in this study is in contrast with another study regarding mortality trends, it showed that nearly all countries have experienced a significant declining trend over 1990 to 2017 which contradicts with this study showing an increase in mortality rate through out the years (Amini et al., 2021).

Also, a previous study contradicted this study because in the previous findings cardiovascular death rates have decreased by 16% per cent globally between 2000 and 2015 (Sidney et al., 2016). The mortality rate for CVD in 2019 was at its highest (3.5%) mortality even though 2019 recorded the least population throughout the seven years.

4.1.3 Chronic respiratory diseases mortality rate trend

In the study, the mean mortality rate for respiratory diseases was 1.3%. The result showed that respiratory diseases ranked second amongst all the four groups of non-communicable disease mortality from 2013 to 2020. These findings disagrees with a study that stated that by 2020 chronic respiratory diseases(COPD) is expected to be the third most common cause of death worldwide (Habib & Saha, 2010).

The trend for respiratory disease showed an increasing trend from 1.3% mortality (84 deaths) in 2013 to 2.0% (99 deaths) in 2017 and 1.4 % in 2020 this was in agreement with a study done globally from 1990 to 2017, had their mortality rate 3.91, thus the trend increased from 3.32 million deaths in 1990 (Li et al., 2017).

4.2 Projections of non-communicable disease mortality for the four categories (cancer, cardiovascular diseases, respiratory diseases and diabetes)

4.2.1 Cancer mortality rate projection

The main themes that came under the projections of mortality rate trend for cancer were the exact mortality rate in 2013 and the predicted mortality rate by 2025. The projection from 2013 to 2025 the trend was stable throughout the years. This is in contrast with the study done in Iran which showed that the mortality rates for cancer in both sexes will be in constant decline until 2030. The change in mortality was -44.7 % depicting the fact that the mortality rates for cancer are expected to move from 81.8% in 2015 to 45.2% (Shadmani et al., 2019). To add up, the results were, in contrast with previous research which also predicted the decline in cancer mortality rates by 2030 (Carvalho Malta et al., 2020).

4.2.2 Cardiovascular disease mortality rate projection

The findings of the study showed that the projection of cardiovascular diseases mortality rate is likely to be 3.7% in 2025. This depicts an increasing trend of cardiovascular disease from a 3% mortality rate with a per cent change of 18.92% from 2013 to 2025. This was in contrast to

previous study where cardiovascular diseases were in decline. The percentage change from 2015 to 2030 where the mortality rates would decrease from 307.3 per 100,000 deaths in 2015 to 173.0 per 100,000 deaths in 2030. (Shadmani et al., 2019).

4.2.3 Chronic respiratory disease mortality rate projection

The trend in the mortality rate of chronic respiratory disease had an increasing trend in the death rates from 2013 to 2014. The percentage change recorded was 31.58% (highest percent change within the four groups). Taken from the fact that the mortality rate for chronic respiratory diseases was 1.3 % in 2013 and increased to 1.9 %. This was also in contrast with a previous study where the mortality rate rather decreased with a percentage change of -10.6 showing that the mortality rate would decrease from 52.1 per 100,000 in 2015 to 46.6 per 100,000 in 2030. (Shadmani et al., 2019).

4.2.4 Diabetes mortality rate projection

The trend in the mortality rate of diabetes depicted an increasing trend. It showed an increase in the death rates from 2013 to 2014. The percentage change recorded was 8.33% taken from the fact that the mortality rate for chronic respiratory diseases was 1.1% in 2013 and increased to 1.2%. This is also in contrast with a previous study where the mortality rate rather remained sturdy and therefore had no percentage change. Showing that the mortality rate would stay from 16.5 per 100,000 in 2015 to 16.6 per 100,000 in 2030. (Shadmani et al., 2019).

5.0 CONCLUSIONS

5.1 The trends of non-communicable diseases.

Cancer had the most encouraging trend even though it is the second-highest cause of death globally. It showed a stable trend. Also, the cardiovascular disease had the highest mortality rate. To add up males had the highest mortality compared to females for most years.

5.1.2 Projections of non-communicable diseases

The study proved that the trends in non-communicable disease mortality in Bono Regional hospital is increasing and also expected to increase if all the factors that were involved in the trend persist.

Also, Cardiovascular is still predicted to have the highest mortality rate compared to the three non-communicable diseases (cancer, chronic respiratory diseases and diabetes.). Though cardiovascular diseases had the highest mortality rate, the results show that respiratory diseases are expected to increase the most.

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